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## The Effect of Nature Work in a Primary-Aged Montessori Environment

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The Effects of Nature Work in a Primary-Aged Montessori Environment

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in fulfillment of final requirements for the MAED degree

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### Abstract

This study investigated how children responded to participating in twenty minutes of nature-based activities that involved direct contact with dirt. The study took place in a Primary Montessori school with 27 children ages 3 to 6 years. The research was conducted over a six-week period in which a pre-assessment was conducted in the first week, followed by four weeks that consisted of presenting 20 minute Nature Work lessons on a daily basis. Once children were shown how to use the materials, data was collected regarding their participation and independent use of the materials. In addition, daily journaling by the researcher was completed to document self-reflection of children's responses to Nature Work. During the sixth week, a post-assessment was conducted to indicate whether the Nature Work intervention influenced the children's interest in connecting and engaging more deeply with nature.

Results of the research suggest that the children's participation increased over the duration of the intervention. However, the perceived interest/enjoyment decreased slightly, according to the responses to the Pre- /Post-Assessment questions. The children remained engaged and interested in participating in the Nature Work options: Bulb Planting, Seedling boxes, Transplanting Plants and Worm Composting. A longer study is recommended to increase opportunity for participation in the Nature Work intervention and increase data collection.

*Key words: nature work, dirt, bulb planting, seedling boxes, transplanting plants, worm composting*

This study was designed in the interest of keeping children connected to nature on a daily basis, which inspired me to consider how children feel after connecting with nature, by working directly with dirt. Furthermore, the commitment to supporting a child's connection to nature stems from my understanding of human development, within the context of the Montessori pedagogy. Therefore, I examined the effects of a daily opportunity for 20 minutes of Nature Work (involving direct contact with dirt) on children between the ages of 3-6 years. I believed it would be beneficial to monitor how and if the children's interest and level of participation in nature-based activities changed as a result of the intervention.

Moreover, this particular action research may provide a framework for further research study. During general observations, the children exhibit great interest, joy, connectedness, and fulfillment when participating in nature work in the school garden, such as harvesting vegetables. There is a particular natural element that purposeful work in nature (that includes direct contact with dirt) offers the child. The focus of this study is to address the human need to remain connected to nature and access nature's innate ability to restore health by improving equilibrium within the child. Therefore, further exploration of increased opportunities to work in nature may reveal a greater need to be met in the children and may inspire development in this area.

## **Review of Literature**

The term Nature Work as it pertains to this study will specifically refer to activities within the Montessori Primary environment, consisting of the mixed age group: 3-6 years old, that provide the children access to working with nature connecting materials and dirt for at least twenty minutes. These activities may consist of the following: preparing seedling boxes, worm composting bin, bulb planting, taking a plant and transplanting it from a small container into a larger container. The basis of this work involves connecting the child with activity involving dirt on a daily basis, whether indoors or outdoors.

Direct contact with dirt allows the child to remain connected with the earth, as dirt is the living matter that is essential to the continuation of life on earth, which Dr. Montessori recognized as an essential component of development. Moreover, having direct contact with dirt provides the child with a tangible and sensorial experience that goes far beyond the limitations of reading books or listening to a lecture about the material. The child has the opportunity to have a life experience with natural material that embeds itself in the child's being. Dr. Montessori identified the child's need to engage in meaningful work within the indoor environment or outdoors in nature. Many Montessori school environments have included direct access to a natural environment and oftentimes only separated by a door or pathway. However, some environments may be housed in pre-existing structures such as storefronts or churches with differing levels of access to nature and this study brings nature into the environment.

## **Benefits of Connecting with Nature**

Much of the literature suggests that it is essential to play outside and connect with nature to support healthy child development. Maller (2009) addressed whether children benefit from contact with nature and includes the perspectives of principals, teachers and environmental educators in Melbourne, Australia. Maller's study specifically looks at the attitudes educators of the elementary school-aged children (5-12 years), which utilized in-person interviews with the aim of expressing the value of "hands-on contact with nature at school." (2009, p. 522) The hands-on work involved direct contact with dirt, plants, and animals, whether by working in the school's community garden to plant and harvest fruits/vegetables or engaging in the care of animals.

Maller's study discovered that the children do benefit from contact with nature becoming more engaged and physically active. Furthermore, with continued reliance on electronic devices and artificial environments over physical/manual movements and natural environments more children are being removed from experiences in nature. She stated that one participant indicated, "Apart from enjoyment, the development of skills in care and nurturing of plants and animals...One teacher described how he believed that these skills transfer to the care and nurturing of people." (2009, p. 532) All of the educators interviewed believed that contact with nature would support a child's wellbeing in many different ways. The result of Maller's study revealed, "As the majority of opportunities for modern children to experience contact with nature appear to be occurring at school,

the amount of access to nature that school settings provide is becoming increasingly important." (2009, p. 238) She furthers this statement by suggesting that the school environment is the best space for incorporating nature connections and ecological education.

Acar and Torquati (2005) concluded that as children engage in nature the opportunity to develop pro-social attitudes and behaviors increase, stating that "Direct experiences with nature provoke curiosity and questions about the plants, animals, places, and elements the children encounter." This particular study further supports the idea that children receive many benefits supporting all aspects of healthy human development, which include physical and emotional wellbeing. In addition, O'Shaughnessy states,

"The child by nature loves the environment. By helping the child forge an emotional bond with nature, we help guarantee survival of the species as well as renewed health for our planet. Dr. Montessori's vision of the child included a blueprint that would help forge this bond between the developing being and the natural environment – a plan that ultimately empowers the child to find his place in society and nurtures his innate love of the environment." (2013, p.282)

Hence, the child must remain connected and interact with the natural environment to develop a healthy sense of self and respect for all life forms on earth.

### **Detrimental effects of losing connection with nature**

The literature suggests that a real problem exists when children lose contact with nature, which can have detrimental effects on human development during one's childhood experience, which has been referred to as "disembodiment and denaturing." (Rathunde, 2013, p. 237) Dr. Montessori herself was adamant in discussing the need for children to participate in outdoor work, whether it involved bringing the Pink Tower outside to construct or performing other works to care for the environment, such as vegetable gardening. The literature highlights this key concept expressed by Vaz (2013) who stated, "In the twenty-first century, modern man is losing this bond with nature. We as Montessorians need to be able to rise above the omibus to get ourselves out of this box, to shake off our paradigm paralysis and to return the child to nature in our own prepared environments" (Vaz, 2013, p. 73).

The literature also indicates that when children lose connectedness with nature and outside experiences, the child can experience a myriad of detrimental health issues. For instance, in the book, *Last Child in the Woods*, Richard Louv (2006) refers to this disconnect as "nature-deficit disorder" Louv (2006) describes it to be "one factor that may aggravate attentional difficulties for many children" and the increase in the diagnosis of mental disorders in children, like ADHD especially in young boys, between the ages of six and ten years (Louv, 2006, p. 99). However, it is significant to say that health challenges are experienced by both male and female children who spend the majority of their day indoors in artificial environments, rather than outdoors in nature (Louv, 2006). The health-related concerns include a variety of illness that impact both physical and mental functions, such as childhood

obesity, diabetes, aggravating the symptoms of ADHD, and impairment of cognitive function. Louv (2006), defines the nature-deficit disorder in the following statement, "Nature-deficit disorder describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties and higher rates of physical and emotional illnesses." (Louv, 2006, p. 34). Moreover, Rathunde (2013) cites "disembodiment and denaturing as needing to be countered by contact with nature, leading to higher creativity, less drudgery, and more positive social interaction," as he witnessed in his studies.

## **Conclusion**

The overarching message derived from the literature argues a substantial case for keeping children engaged and connected on a daily basis with nature. This idea urges for the sake of the children, society and the health of our natural world to provide more opportunities for children to get outside now. The child requires more than just the twenty minutes being implemented by the Nature Work intervention, but as for as often and as long as possible to support healthy human development for generations to come. Moreover, there appears to be a direct correlation between engaging in physical activity in nature that results in a calming and peaceful experience for both children and adults. The idea that "Nature engages a different kind of attention that's more automatic and effortless, a kind of calm, focused observation that restores the ability for directed and selective attention. It is called attention-restoration theory." (Kaplan, p. 239) The results of this research will hopefully contribute positively to the sounds of the conch calling to invite more

of humanity to remain connected to nature for the peaceful and healthy life that so many members of our over-stimulated society continue to seek out.

### **Methodology**

The Nature Work study began on the week of February 5, 2018 in a Primary Montessori environment. I informed the school administration and staff of my plans to conduct the Action Research study for a total of six weeks. The six weeks included two weeks of Pre- /Post-Assessment data collection. The assessment consisted of asking the children two questions prior to introducing the intervention and asking the same two questions after the four weeks of intervention were complete. The questions asked were: 1. How do you feel when you connect/work with nature? and 2. How do you feel when you work with dirt? (see Appendix A) I asked the child the first question, waited for a response, recorded the child's response and repeated the same process for the second question. The following four weeks consisted of presenting material on a daily basis for twenty minutes during the afternoon work cycle.

In the second week of data collection, I introduced Worm Composting into the environment and began presenting to children during the afternoon work cycle. The box was prepared prior and consists of two plastic bins stacked inside of one another and a plastic lid. I drilled holes into the bottom of the bin that is placed inside the other bin (for drainage of moisture), as well as in the lid for airflow. I hand shredded newspaper and placed it inside of the interior bin, put in one pound of worms, added more shredded newspaper and sprayed the newspaper with water



to moisten the environment. Finally, I placed the entire box on top of a wooden base with wheels to make it mobile. Once I completed the preparation of the box, I was able to introduce the box to the children and present the work of the Worm Composting. The process of introducing the material involves wheeling the work into the environment and placing the presentation basket in the environment on a designated table. It includes an apron, a container with either fruit or vegetable scraps to feed the worms and pages of newspaper for shredding into the container. I invited a small group of children to gather around the container and began introducing all the materials: apron, food compost container, and newspaper and indicated that after completing this work we always wash our hands. After introducing all of the materials, I asked one child to put on the apron while I presented the work, opened the container and showed the children the red wiggler worms and asked them to watch how I care for the worms. I opened the food compost container and counted out only three pieces of food to place into the bin. I took one page of newspaper and began to hand tear from top to bottom, carefully placed the piece into the bin and repeated until the entire page was shredded into the bin, then washed my hands. I invited the child to repeat and when the child completed the process I invited another child participate, until every child present took a turn. In order to ensure that all the children could receive the presentation, I continued to present Worm Composting work everyday.

During week two, I also introduced the work of Transplanting Plants to a small group of children. This work involved transplanting a plant that was already growing in the environment from its current pot to another. I also showed some of

the children how to separate multiple plants growing in one container and transplant them into one container each, so that the plant may grow and expand its root system within the new container. The Transplanting work consisted of a wooden tray with an apron, a trowel, a plant pot and a bucket of potting soil. When I presented the work, I invited a child to put on the apron and introduced the materials. I gave the child language for the materials: trowel, planter, bucket and potting soil. After introducing the material, I asked the child to follow me and I chose a plant to transplant. I returned with the plant to the table and took the trowel handle in one hand, placed the trowel into the planter with plant in order to loosen the soil around the plant. I demonstrated how to remove the trowel, place it on table and turn the planter, then return the trowel into the planter working around the whole plant. Once I had done this and turned the entire planter around and arrived at its original placement, I showed the child how to take the plant out of the planter. I placed one hand at the base of the first planter and inserted the other hand into the soil. I carefully lifted the plant out of the first planter and placed it into the second planter. I centered the plant with one hand and used the trowel with the other hand to scoop potting soil out of the bucket into the planter with the plant to ensure the root system was covered. After covering the root system, I placed the trowel back into the wooden tray and showed the child how to gently pat the soil into place around the base of the plant. I invited the child to join me in returning the newly transplanted plant back into the environment and I showed the child how to clean up the dirt that fell on the table and placed it into the bucket to reuse the dirt. I invited the child to repeat the process.

The presentation of Seedling Boxes was presented next and consisted of a tray with the following materials: apron, five types of seeds (basil, rosemary, spearmint, chamomile and cilantro), paper planter containers, a trowel, a bucket containing potting soil and a spray bottle. I also brought in another tray with a lid to hold the planters together once seeds were planted and kept them all on the windowsill to access sunlight. The presentation involved first introducing the materials and giving language by naming the seeds and showing the picture of the plant that each seed can grow to become. I invited one child to put on the apron and the other children observed while I began by identifying the type of seed I wanted to plant, wrote down the name on a strip of lined paper, cut the strip and taped it to a planter. Next, I took trowel and scooped out potting soil from the bucket, filled the planter with soil and returned the trowel to the tray. I placed my index finger into the center of the planter half way and indicated with my other hand where I stopped. I lifted out my index finger from the soil in the planter and showed the child that I had made a small hole. I opened the container with the seeds, poured the seeds into the palm of my hand and told child I would only use three seeds. I placed seeds into the hole and returned any excess seeds in my palm back into the container and returned it to the tray. Next, I covered the hole by smoothing the dirt in the planter over the small hole containing the seeds and placed the container in the larger tray with the cover. I took the spray bottle, sprayed the soil in the planter six times and returned the spray bottle to the tray. Finally, I invited the child to repeat and supported the child in writing the name of the plant on the strip of paper.

The next presentation of Bulb Planting involved the planting of Gladiola flower bulbs into a planter and consisted of the following materials: apron, metal container with materials: trowel, container of bulbs, planter and another metal container with potting soil. I began by introducing all the materials and by telling the child the name of the bulb, “gladiola” and showed the child a picture of the gladiolas. I talked about how the bulb would grow to become a gladiola plant that blooms many blossoms on the same stalk. Next, I invited a child to put on an apron. I began the planting process by taking the trowel and scooping potting soil from the bucket into the planter. I continued filling the planter three quarters of the way and aligned my hand on the outside of the planter to show the children how much dirt to put into the planter. I took one bulb to place into planter and indicated that the point would be facing upwards. Once the bulb was in place, I took the trowel and scooped soil over it until I filled the planter, leaving only about a half inch of space on top. I returned the trowel to the tray and asked the child to join me to place the planter on the windowsill. When the child and I returned, I invited the child to repeat and stepped back to observe.

After presenting the Nature Work daily for twenty minutes, I recorded on the Tally system (see Appendix C) which work was done that day. I would also take time to observe the work (see Appendix B) and take notes on the children’s responses to the work. At the end of each day, I would take time to journal, either by responding directly to a journal prompt (see Appendix D) or by writing down pertinent information regarding my observations that day. In addition, I completed the data collection in week six with the Post-Assessment and asked the children the

same two questions, as previously asked during the Pre-Assessment in week one (see Appendix A).

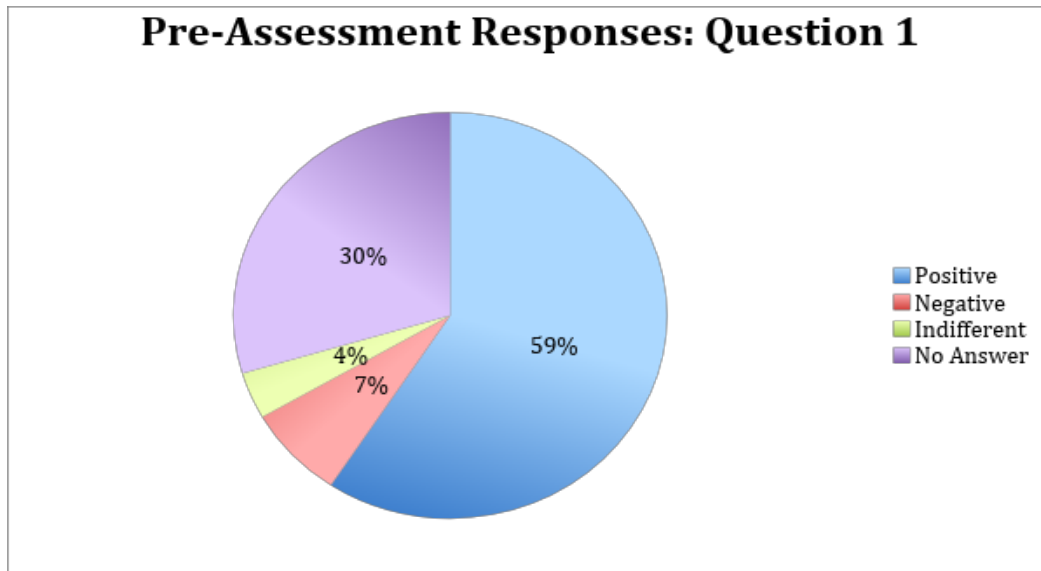
### **Analysis of Data**

Upon completion of the research project, I evaluated and analyzed the data collected from the four data tools: Pre-/Post-Assessment, Tally System, Journal, and Observation Log.

#### **Data Tool: Pre- /Post-Assessment**

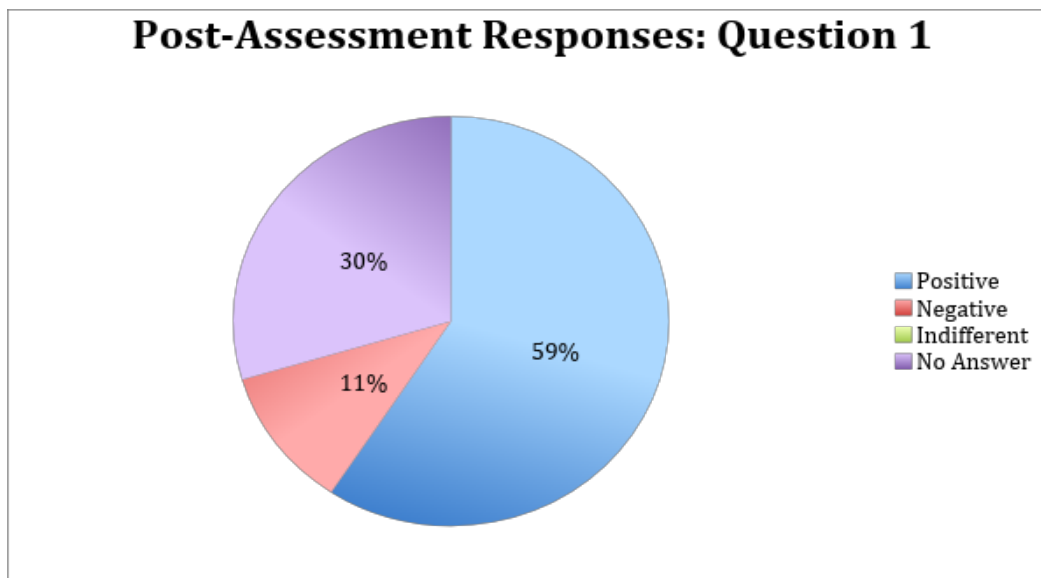
The Pre- /Post-Assessment gathered anecdotal responses from the children prior to engaging in the Nature Work intervention (1 week prior) and after participation (1 week after). The assessment indicated whether the Nature Work intervention influenced the children's interest to connect and engage more deeply with nature.

The Pre-Assessment was conducted during the first week and the Post-Assessment was conducted after completion of the Nature Work intervention. The 27 participants were asked two questions: **1. How do you feel when you connect/work with nature? 2. How do you feel when you work with dirt?** Responses were recorded and coded to reflect the following: P for positive or N for negative response, I for indifferent or NA for no answer. Indifferent response consisted of responses consisted of answers like, "I don't know" or comments that did not pertain to the question.



**Figure 1.** Chart demonstrates responses to Question 1 during the Pre-Assessment.

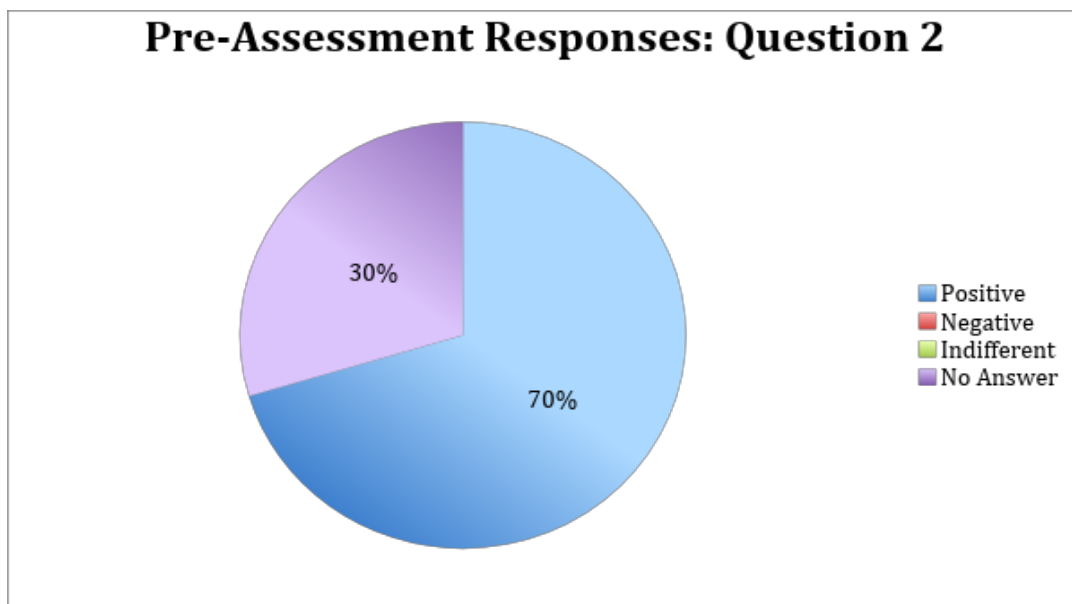
The Pre-Assessment responses showed the results of 59% positive, 30% no answer, 4% indifferent, and 7% negative prior to the start of the intervention.



**Figure 2.** Chart demonstrates responses to Question 1 during Post-Assessment.

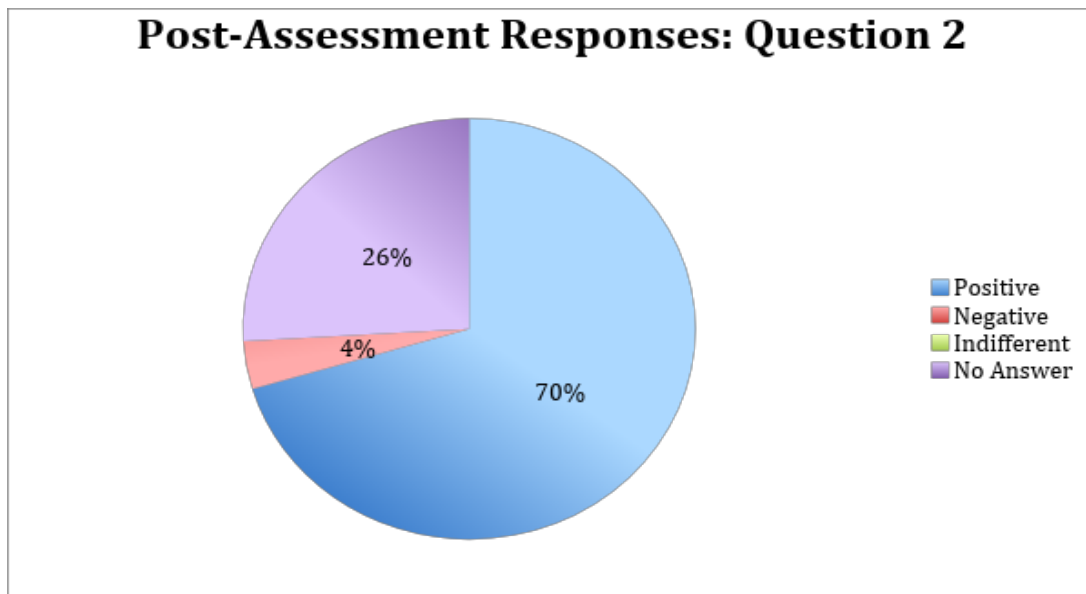
The Post-Assessment responses showed the results of 59% positive, 30% no answer, 0% indifferent, and 11% negative after the intervention.

A comparison of the Pre- and Post-Assessment data in the charts revealed the children who originally responded with indifferent answers in the Pre-Assessment provided negative responses during the Post-Assessment phase. The negative responses increased by 4 percentage points after having completed the four-week intervention. The 4% shift to negative responses, prompted me to review my notes from the assessment for a possible explanation. Examination of the notes showed one child changed from an *indifferent* to a *negative* response due to their hand hurting, suggesting a possible explanation for what may have happened. This brings to light other factors influencing the participant's responses.



**Figure 3.** Chart demonstrates responses to Question 2 during Pre-Assessment.

The Pre-Assessment responses showed the results of 70% positive, 30% no answer, 0% indifferent, and 0% negative prior to the start of the intervention.



**Figure 4.** Chart demonstrates responses to Question 2 during Post-Assessment.

The Post-Assessment responses showed the results of 70% positive, 26% no answer, 0% indifferent, and 4% negative after the intervention.

The data reveals that after completing the intervention some of the children who provided no answer in Figure 3 responded negatively to Question 2 in the Post-Assessment phase displayed in Figure 4. The negative responses increased from 0% to 4%.

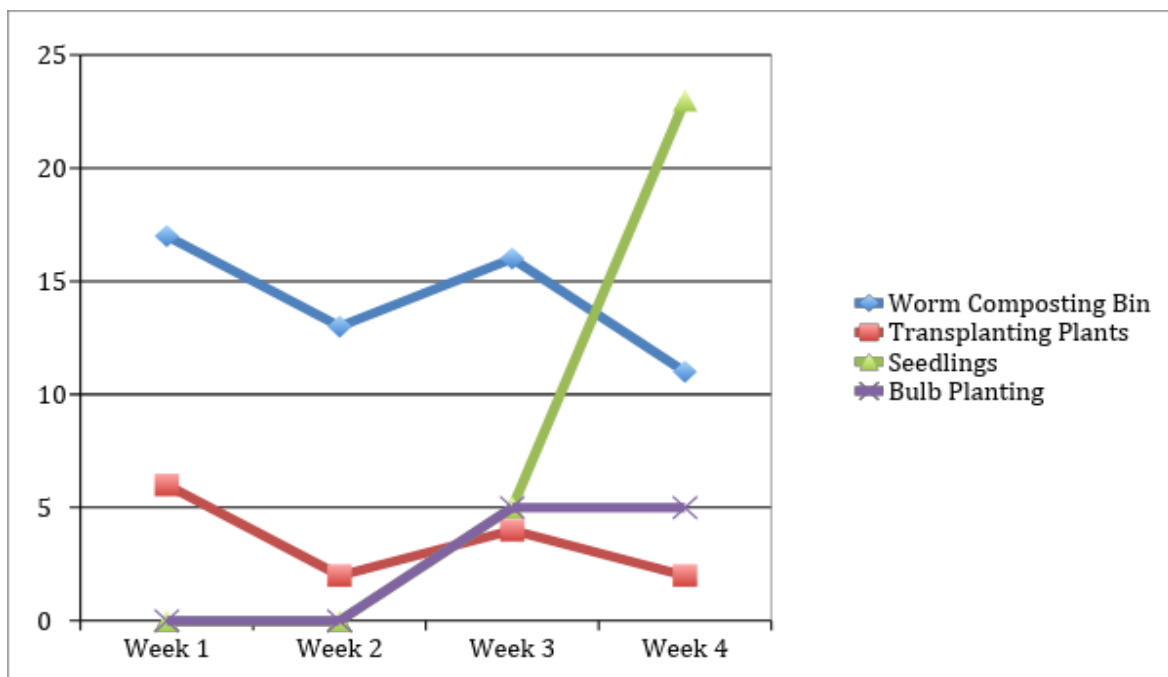
No clear conclusions from the data in Figures 1-4 emerged to explain the impact of the intervention. Therefore, I reviewed the observation log and journal in searching of a possible explanation of the results. My notes in both the observation log and journal did not reveal patterns to explain the rise in participation with a consequential increase in negative responses after completing the intervention. No clear conclusion was reached after review of the notes. However, it is quite possible the changes witnessed in participation could be due to the introduction of a new activity and not due to a direct correlation between the pre and post exposure of the



intervention. Another possibility for the reported changes could be due to the child's lack of understanding/purpose of the questions posed and the intervention activities.

### Data Tool: Tally System

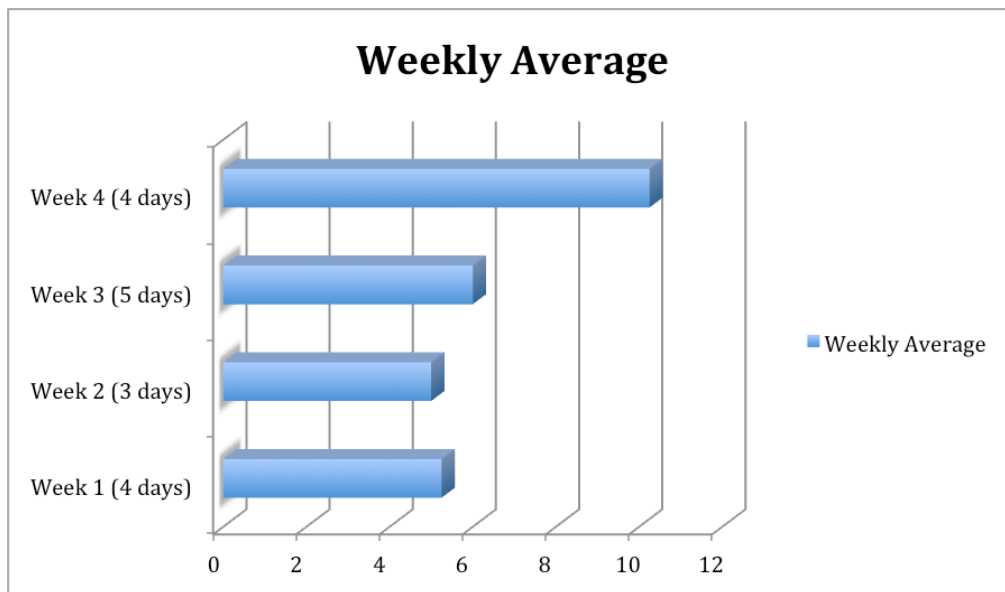
The data collected in the Tally System provides statistical evidence of participation in each nature-based activity during the intervention. The use of the Tally supports evidence of interest and engagement in a particular activity, as a result of participation in Nature Work study.



**Figure 5.** Graph displays the **participation rate** for each Nature Work option during the 4-week intervention.

The total participation rate for each week was as follows: week 1: 21, week 2: 15, week 3: 30 and week 4: 41. Results demonstrate an increase in participation rates with the exception of week 2. During week 2 there were only 3 days of school and the reduction of days clearly affected the outcome of participation.

Moreover, during the first two weeks of the intervention only the Worm Composting Bins and Transplanting Plants presentations were offered. This occurred to emphasize the steps involved in introducing the live worms into the environment, feeding and caring for the worms, as well as washing hands after completing the activity. Additional time was utilized to talk about the purpose of leaving the worms in the bin and to explain what foods could be used to feed the worms. The children and I also discussed how the worms ate the foods and created dirt out of their fecal matter called “castings”.



**Figure 6.** Graph displays the weekly average based on the number of participants per school day.

The graph organizes the number of nature work participants on a daily basis per week and reveals the weekly average. The results presented in this graph reveal that there is no direct correlation with the number of school days and a decrease in participation and lower weekly average. Each week demonstrated an increase in participation with the exception of Week 2, which only had three days of school and

an average of 5 participants. Week 1 consisted of four days and averaged 5.25 participants. The subsequent weeks concluded as follows: Week 3 with five days of school averaged 6 participants and Week 4 had four days of school with the highest average of 10.25 participants. The data collected is inconclusive.

### **Data Tool: Observation Log**

Observation Log provided a record of work chosen after receiving Nature Work presentations. The log gathered evidence of engagement in nature work and the children's responses and comments about nature/dirt and indicated whether the intervention influenced participation. Once the intervention was complete I reviewed the observations and recognized themes emerging. The following themes guided the organization and representation of the information over the course of the study.

**Attitudes.** The children regularly expressed their attitudes and candidly shared thoughts while working with nature materials. Some of the attitudes were communicated verbally and others through facial gestures or physical responses to the materials. For instance, when I entered the environment with the Worm Composting Bins four children approached me and when I removed the lid they all smiled with excitement. Another example included a child excited to transplant a fully-grown plant, while another child observed the transplanting and beamed with joy. Furthermore, while working in a small group I witnessed children eager to receive the Seedling presentation. In another moment, five children gathered around as I brought in the Worm Composting Bin and asked to do the work.

**Discussions.** A natural part of the learning process is communication and the children exchanged many peer-to-peer discussions about the nature work materials. For example, a child asks another child why there is newspaper in the Worm Composting Bin or children talked with each other about the worms and said look for the babies. At another time, the children talked about which seeds they wanted to plant: basil, chamomile, cilantro, rosemary and mint. Before participating in a Seedlings presentation, children gathered to smell the plant samples and touched the leaves. They socialized and encouraged one another to smell each plant and confidently expressed which plant they would grow. Other instances consisted of general reminders or social graces, such as when a child reminded another to use only one newspaper for the worms or children taking turns watering the bulb planters and socializing.

**Concentration.** Many instances of concentration were observed while engaging in the nature work intervention. The concentration was recorded when a child kept their eyes on the task, leaned into focus on work or carefully engaged with material. For example, a child holds soil with great care, keeps eyes on soil and carefully pours into a planter. A child focuses on writing out the name of a seed (rosemary) on paper and labels the small pot. The child is focused on transplanting and packs the soil into the planter very firmly. In another instance, a child feeds worms celery and apple cores, places the pieces of food in different areas of the worm composting bin, carefully having repeated the presentation. Finally, a child waters seedlings and slowly counts while investing great effort to firmly squeeze the spray bottle.

**Data Tool: Journal**

Journaling allowed for self-reflection of observations witnessed during the day and any changes in behaviors/reflected attitudes of the children and myself during the intervention. The journaling experience revealed valuable insights to the information that was being collected in the environment via logs, tallies and assessments.

After presenting Nature Work materials, I recorded insights, additional observations or simply chose to respond to a journal prompt in a daily basis. The most influential insight I experienced was when I felt that I needed more than just 20 minutes to present and observe. I also realized that I needed to fluctuate the times in which material was presented and made available during the afternoon work cycle. I understood that if I continued to offer the work at the beginning of the afternoon then I would be presenting to the older children and wanted to be sure to introduce all of the children to the work options. After having recognized this, I began to present the materials right when the younger children were ending naptime and could participate more often. Finally, I accepted that the plant transplanting work needed to be restructured to achieve a greater level of sustainability. After all, it is not good practice to continue to transplant the plants in the environment over and over again. Therefore, I decided to limit the amount of transplanting presentations in order to conserve plants for the entire intervention.

By the final week of the intervention, the research revealed that the children's participation in Nature Work increased. The evidence was present in the

Tally System and supported the Observation Log data, which recorded the children's excitement and willingness to participate and engage in the nature-based activities. Finally, the children revealed how interested they were in working with dirt by continuing to request the work, actively participate and reveal signs of concentration during the activity. There were times during the intervention that I witnessed and recorded how "the children often paused during the work with their hands resting in the container of dirt;" they seemed to take a moment to connect with the material while remaining still.

### **Discussion**

The children demonstrated interest and daily engagement in nature work options during the intervention. The children asked for the work by name and used vocabulary was offered during presentations to refer to specific materials and tools. They also made comments about how new seedlings and bulb plants in the environment were growing. As a result of nature work, the children expressed great interest in the worm composting and continued to be the most popular nature work option. For instance, the children wanted to see the worms regularly to check if more dirt was being produced in the bins from the consumption of food. The children became aware of the necessity to maintain the worms bin environment and asked about feeding the worms or adding shredded newspaper to balance the amount of moisture accumulated in the bin.

In light of all of the positive responses to the intervention, it is worth noting the data was inconclusive and did not provide an explanation. Therefore, I reviewed the Observation Log, Journal and Pre- /Post-Assessment responses and no direct

correlation could be made from the anecdotal data. Perhaps the format of the question or lack of understanding by participant affected the responses to the intervention.

While the quantitative data showed an increase in negative perceptions of time with nature and dirt, it is important to remember the anecdotal evidence showed great interest on the part of the children. Dr. Montessori, as well as many previous nature studies, have shown the great benefits of time in nature and with direct contact with dirt and further studies are encouraged to continue to explore the best ways to incorporate them in the classroom

### **Action Plan**

The purpose of this research was to increase access to nature for the children in a primary Montessori school environment. The research demonstrated that children express interest in nature work as well as experience the benefits of increased knowledge and understanding with nature-based activities. This work provides children an opportunity to learn new vocabulary, participate in nature-connected work, as well as observe and make discoveries. Many school environments take the opportunity to continue to support healthy development of our community's children and this can include making connecting to nature accessible both indoors and outdoors.

The results and findings of this research may continue to inspire educators to increase the level in which children engage in nature for learning experiences. During inclement weather, especially extremely cold winter days, children have limited access to nature as an outdoor learning experience, as well as

connection with dirt. It is important to understand that learning takes place all the time and providing children a regular connection to nature continues this process while supporting human development. Nature Work encourages children to remain connected to nature by increasing interactions with dirt and participating in nature based activities during months of inclement weather.

The work of this project may encourage increasing nature based activities for indoor environments, as well as the outdoor environment. Moreover, the research clearly demonstrates the interest and possibility of successfully increasing access to nature and learning for both children and adults in the environment, as it fosters furthering the care of the environment/nature. During the Nature Work study the children would express enthusiasm and excitement every time the work was introduced into the environment and presented to small groups or individually. Many children often approached and asked if they could do the work on a daily basis. On other occasions parents or family members would ask to see the nature work, especially the worms in the composting bins, which indicates that both interest and learning benefits were spread into the community, as a result of the children's experience with nature work. After having participated in the action research, I am committed to keeping nature work a part of the indoor classroom and to supporting work outdoors.

### **Future Directions**

Nature Work provides many potential options for future research investigations within the primary Montessori environment and will be addressed below.



The first option would include a longer intervention period to begin in the summer or fall and extend into the winter months to measure the necessity of a range of options that specifically include working with dirt. One may also choose to begin this research during winter months and extend data collection into summer months to measure the need and impact of regular exposure to nature activities involving dirt contact. In addition, the researcher may consider providing the nature work options during all work cycles, essentially providing work options all day and everyday to gather more data and increase knowledge and learning experiences.

I would also encourage the development of a rubric measuring knowledge and connection to nature work/experiences during the pre-/post-assessment data tool. The rubric would provide a numerical score based on the participant's responses to questions asking how much they know or engage in certain nature based activities.

Furthermore, the research may consist of the introduction of different work options beyond those that were included in this action research project, such as sifting the dirt produced in the worm bin. Although, this work still involves the worm composting bins, it allows the children to participate in extracting the dirt from the bin, separating the worms and returning them to the bins. This is one more opportunity for the children to have direct contact with dirt in the nature work process and allows them to experience the full cycle of the worm composting process. Otherwise, the research could limit the nature work option to only one type of dirt related work where the children are presented the material in phases,

such as collecting compostable foods, feeding worms, shredding newspaper, separating dirt and returning worms to bin and lastly using the dirt in raised bed gardens or adding to soil for current plants in the environment.

It would also be interesting to look at the effect of consistent nature work on classroom management and focus on aspects such as: concentration, movement or conflicts. Perhaps further exploration on the connection to nature, practical life work and classroom management through the lens of Dr. Maria Montessori's extensive writings could offer more depth to analysis. This could also be expanded with the introduction of a nature and a non-nature work interventions for comparison. For example children could play with dirt direction and another set of children could be shown a video/film of other children working with dirt. This approach could help us determine which intervention holds more interest.

Finally, the researcher may include having another trained adult in the environment available to collect data and record observations only for the nature work, while the other teacher continues with presenting other materials and completing regular daily duties. Certainly another option could also include recording/filming the environment one week prior to introducing the intervention, during the intervention and one week after conclusion of the intervention to provide additional reference detailing the environment and interest in the nature work.

Nature Work research was designed to encourage and inspire children to seek nature based learning experiences beyond the indoor environment. It may also serve as a reminder to us all that nature connections can occur long after we leave

the outdoors. The work is not meant to be intimidating for the adults or children in our schools, but instead a learning experience and process for our entire learning community. The notion that we must become experts to conduct this work is a fallacy and limits access right at the beginning. We can begin by having a conversation and immediately get our hands in the dirt, because it is possible and necessary to connect with nature on a regular basis. In conclusion, nature access provides a myriad of benefits to humanity and conducting more research supports this basic idea, which results in supporting the growth of healthier children in school learning environments.

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## **Appendix A**

NATURE WORK STUDY

DATA TOOL: Pre-/Post-assessment

Participant ID:

Pre-assessment date:

1. How do you feel when you connect/work with nature?

2. How do you feel when you work with dirt?

Post-assessment date:

1. How do you feel when you connect/work with nature?

2. How do you feel when you work with dirt?

**Appendix B**

NATURE WORK STUDY

DATA TOOL: OBSERVATION LOG

Date:

Observation log for work chosen after receiving the Nature Work presentations or additional responses from children, such as expression of interest.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_
18. \_\_\_\_\_
19. \_\_\_\_\_

### Appendix C

NATURE WORK STUDY

DATA TOOL: TALLY SYSTEM

Date:

Worm Composting Bin	Preparing Seedling Boxes	Bulb Planting	Transplanting Plants

Date:

Worm Composting Bin	Preparing Seedling Boxes	Bulb Planting	Transplanting Plants



## Appendix D

### NATURE WORK STUDY

### DATA TOOL: JOURNAL PROMPTS

A prompt can be chosen to initiate the daily journaling process or choose to write based on a particular observation or insight that will support the data analysis.

1. Write about how do you think the participants will respond to\_\_\_\_\_presentation?
2. Did the participants ask you any questions or share ideas about the Nature Work presentation\_\_\_\_\_you offered today?
3. How do you feel engaging in the Nature Work study, as a Montessori Guide?
4. Do the children appear to be enjoying the work, if so? How can you tell? Cite specific examples.
5. Are the children having conversations about the Nature Work, when not specifically engaging?
6. Does there appear to be a greater interest in Nature Work (answer after completing the first week of Action Research)? If so, cite specific examples.
7. What types of language are the participants using to describe the Nature Work today?
8. How are the participants responding to having live worms in the Worm Composting Bin?
9. How long are children able to engage and concentrate in the Nature Work? Cite the name of work and number of minutes.
10. Do the children appear relaxed or anxious while engaging in Nature Work? If so, what are some physical indicators?

## Appendix E

### Bulb Planting Presentation



## Appendix F

### Seedling Boxes Presentation





## Appendix G

### Transplanting Plants Presentation



## Appendix H

### Worm Composting Bin Presentation

